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Mindfulness Training Workshop for Airline Pilots

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Abstract

The science on mindfulness as it relates specifically to aviation is sparse. It has only been in recent years that mindfulness has been examined as it relates to aviation. That being the case, this paper draws connections from areas that are already well studied with mindfulness; stress, anxiety, attention, and communication. Evidence exists that even short duration mindfulness interventions can have positive effects on mindfulness. The one-day workshop created with this thesis gives pilots a cursory overview of mindfulness as it relates to various areas of commercial aviation. Furthermore, the workshop will teach pilots how these different mindfulness techniques can be used to improve their performance while on and off the flight deck.

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Mindfulness Training Workshop for Airline Pilots

A professional airline pilot has a lot to manage. A newly hired pilot for a major airline has already logged thousands of flight hours accumulated over several years of flying smaller aircraft. Then, once they are hired at a major airline, they have to complete the individual airline's training program which can be as long as two or three months. This training is exhaustive. If a pilot is not able to keep up and fails out at any point in training, the pilot could find it difficult to find another flying job. This creates pressure on the pilot to not fall behind and risk losing a career that they have worked hard to attain. This pressure can take a toll on a pilot.

There is a significant level of stress associated with flying a commercial aircraft. Small mistakes can lead to dire consequences, including the destruction of the aircraft and the loss of all lives on board. But a pilot is also subjected to the same life stressors as most people; at times this stress will find its way on to the flight deck causing distractions. Even with no stress at home a pilot needs to maintain a high level of attention and awareness while flying. If small errors are missed, they could be the beginning of an error chain that could lead to an accident. Without exception, a pilot needs to keep a clear head while at work.

Mindfulness may be a tool to help pilots in two significant ways. The first is to help a pilot with the stress and anxiety from the challenges of the profession. The second area is in how pilots perform while flying. The flight deck of a commercial airplane, even when all is working as intended, is a busy place. Jon Kabat-Zinn describes mindfulness as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally". Paying attention on purpose is a critical skill that pilots need to employ to be successful. Even on a routine flight the threats to the flight are constant. A pilot needs to be skilled in attention, focus, and awareness.

Once out of the flight deck, mindfulness could help pilots deal with the stress of being away from their friends and families for days at a time. But more importantly, mindfulness can teach how to work with the stress so that it does not become a distraction.

Mindfulness can help train pilots to know when their mind has wandered then bring it back to the present moment. There is evidence that pilots with greater mindfulness through improved risk assessment have lower rates of accidents and incidents, so much so that even a pilot with less flight experience yet greater mindfulness may have a lower incident rate than a more highly skilled pilot that is less mindful (Ji et al., 2018, p. 166). The creation of a workshop, specifically tailored for airline pilots, is a step toward training pilots how to recognize the moments of mind wandering, whatever the cause, and return their thoughts to the present.

Literature Review

The relevant literature specifically connecting mindfulness to piloting an aircraft is nearly non-existent. There are many aspects of being an airline pilot that have been studied and can be correlated. The effects of stress, anxiety, and depression effect airline pilots and are all well studied outside of aviation. While operating a flight; attention, awareness, communication, and good interpersonal skills are all important. While mindfulness has not been widely studied specifically for airline pilots, a large body of research exists for mindfulness outside of aviation.

Mental Health Impacts

In an effort to assist pilots, from the beginning student pilot to the most experienced commercial airline pilot, the FAA created the acronym IMSAFE to help determine their fitness to fly; I – Illness, M – Medications, S – Stress, A – Alcohol, F – Fatigue, and E – Emotion. Prior to each flight a pilot is instructed to reflect on each letter of the acronym, making sure there are no impediments which may distract them from flying the aircraft. It is important to note that two

of the items are related to mental state. At times it can be difficult to identify when stress has reached a point in ourselves where it begins to affect other areas. This is why it is important to put mindfulness techniques into the hands of airline pilots. It will allow them to identify when their mental state has reached a point where they should take a day off from flying. Stress and emotion can cause distraction. Distraction can lead to an accident.

Stress, depression and anxiety are not mental health maladies exclusive to airline pilots, but common in nearly every occupation. What is different is the effect on their job performance. The margin of error for a pilot can be very thin at times. If all their attention is not focused on their current task the consequences can be devastating. This section will highlight some of the ways stress occurs and the effect should it be found of the flight deck. Finally, there is a review of depression and suicide among airline pilots and how that compares to the general population.

Stress

To be human is to experience stress. All occupations place demands that can increase stress and anxiety. One thing that makes the role of an airline pilot different is that pilots are required to maintain a medical certificate from the FAA through an Aviation Medical Examiner (AME). Every six months to a year, depending on whether the pilot is a Captain who is in charge of the flight or First Officer who is the second in command, a pilot is required to be examined by an AME to determine that they are medically fit to fly. Part of this examination involves a mental health screening component. While the screening is a cursory examination, it is still a part of the exam none the less. Even alluding to a potential issue with depression is enough for the AME to not issue the medical certificate and require a more thorough examination of the pilot.

This potential for grounding is a reason many pilots do not seek help. A pilot seeing a counselor for family related issues is permitted, but visiting a mental health professional for any sort of psychiatric issues is enough to medically disqualify a pilot. For this reason, pilots will often suffer in silence or, self-medicate in some other way i.e., alcohol, excessive exercise, etc. Approximately 16 percent of pilots in one survey admitted to heavy drinking. The frequency was similar to that of the general population (Modell & Mountz, 1990, p. 457). What is not known from this study, and may likely never be known, is whether or not the pilots that admitted to heavy drinking arrive to the airport under the influence. The rules for airline pilots are different than driving a car. A pilot cannot have consumed any alcoholic beverages within the preceding eight hours before reporting for duty. In addition, the pilot's blood alcohol level cannot be greater than 0.04 percent. This is the bare minimum required by regulation, many airlines have a more stringent standard than this. We will occasionally hear in the news about a pilot attempting to fly an airplane while under the influence, but again, this is an exceedingly rare occurrence. The FAA mandates that airlines implement a random drug and alcohol screening program. An article from 2016 reported, "between 2010 and 2015, FAA records show 64 pilots were cited for violating the alcohol and drug provisions" (Zimmerman, 2016). This breaks down to approximately eleven pilots cited out of the thousands of pilots that operate each year.

Mindfulness is a tool that has shown promise in reducing stress and anxiety in occupations similar to airline pilots. Significant reductions in anxiety, depression, and suicidal ideations were observed after MBSR training in military combat veterans. Using the Five Facet Mindfulness Questionnaire (FFMQ) to test mindfulness and the PHQ-9 to screen depression, veterans were tested at the beginning and end of the 9-week course. The PHQ-9 is considered to be, "a reliable and valid measure of depression severity" (Kroenke, Spitzer, & Williams, 2001, p.

606). The participants are asked nine questions about how often they feel certain things e.g., little interest or pleasure in doing things or poor appetite or overeating. The answers range from Not at all to Nearly every day, with each answer corresponding to a score. If a participant scores a 10 or higher, with a maximum possible of 27, their depression severity is considered at least Moderate. Veterans showed an increase in mindfulness and a reduction in depression. In this survey, 42 percent of the veterans were considered clinically better after the MBSR intervention (Serpa, Taylor, & Tillisch, 2014, p. S23).

Another interesting study looked at pediatric medical social workers who participated in a two-day session modeled after Jon Kabat-Zinn's MBSR. Upon completion of the two-day course, participants received instruction to practice for 20 minutes each day over the remaining six-week intervention. The study used the Professional Quality of Life (ProQOL) to measure compassion fatigue and compassion satisfaction, and the Mindful Attention and Awareness Scale (MAAS) to measure mindfulness. At the end of the intervention participants showed no significant differences between pre- and post-test scores for Burnout and Perceived Stress. However, there was a significant increase in mindfulness (Trowbridge et al., 2017, p.209).

These two studies by no means paint a complete picture of how mindfulness can help reduce stress, depression, and anxiety; but they highlight a couple of important concepts. The first concept is that by looking at the study involving veterans, mindfulness has the potential to reduce depression. The other concept is in how the two studies approached the mindfulness intervention. One used a 9-week MBSR course while the other shortened the formal training to just a 2-day course with 6 weeks of individual practice. Although the approaches differed, both reported increased mindfulness as a result.

Stress, even with no underlying psychological issues, can compromise safety. In the book *Pilot Mental Health Assessment and Support: A Practitioner's Guide*, which covers many of the areas of mental health encountered by a pilot, the authors write, "Relationship difficulties can cause stress and emotional upset. This can have a negative impact on performance including concentration, ability to think clearly and making sound decisions" (Bor, et al., 2017, p. 312) Commercial aviation is a safe form of transportation with many layers of redundancy built into the system, but outside stress interfering with decision making is a problem. Pilots experiencing a higher level of stress remove one of these layers of safety. Instead of concentrating on the tasks at hand, a pilot's mind may be elsewhere because of some external stressor.

An article by Butcher (2002) looked at many of the psychological factors involved with piloting an aircraft. While the article focused on using this information to inform hiring practices of airlines, it none the less provides a valuable insight into the psychological issues facing airline pilots. For the purposes of this paper, the important takeaways are the various stressors experienced by an airline pilot and how those exterior stressors find their way into the cockpit. Then, once in the cockpit, the detrimental effect that stress can have on the safety of flight.

The article, while discussing pilot behavior, provided some real-world examples of how stress manifests to the point of creating an unsafe flight. These examples are a cause for concern. While none of the examples ended in an accident, they very well could have ended this way.

- An airline captain with 18 years of service 'passed out' on two occasions during approach to landings before a co-pilot reported the incidents to the chief pilot of the airline. The captain was placed on medical leave for medical/neurological evaluation. No physical problems were found to produce the incidents following a series of

- medical tests. However, the referral for a psychological evaluation uncovered a serious stress-related psychological disorder.
- A commuter airline captain was required to have a fitness for duty evaluation because of anger control problems. He had gotten into a shouting match, in a fit of anger, with his co-pilot during a flight. A passenger who reported it to the airline overheard this incident. The pilot, who had several similar episodes in the past, was suspended from duty and required to seek anger-management therapy.
 - A transgender airline pilot awaiting gender reassignment surgery was required to have a fitness for duty evaluation because of poor judgment during a flight he landed at the wrong airport following what he thought was an in-flight emergency (it was not). He had reportedly been experiencing a great deal of stress as a result of peer reaction to his cross-dressing during work.
 - An eight-year airline captain for a major air carrier was self-referred for a psychological evaluation because of his phobic concerns over thunderstorms. He reportedly was debilitated to the point that he could no longer fly because of constant fear of thunderstorms. (Butcher, 2002, p. 169)

These examples show clearly what can happen when stress is allowed to permeate the cockpit to the point of causing a significant safety concern. For any occupation, getting into a shouting match with a co-worker is completely unacceptable. It can break down communication between workers. For a flight crew flying at 35,000 feet, a shouting match could be catastrophic.

Stress can be broken down into three basic types: environmental, acute reactive, and domestic. These types of stress arrive from many different sources, some of these sources are unique to an airline pilot. While most people have to cope with marital and family problems,

finances, and interpersonal issues with coworkers, airline pilots have stress sources not common in the general population. Long flights, fatigue, commuting from a distant city to begin a flight sequence, and periodic flight checks are contributors to this stress (Butcher, 2002, p. 174). Long flights and fatigue will likely always be part of the job, pilots will need to be trained on how to cope with these circumstances. Interpersonal issues and marital issues, while similar to other occupations, are different in the life of an airline pilot. A pilot is not able to simply say I will be home tonight to deal with an issue. It may be three or four days before a pilot is home to fix the washing machine or have an important discussion with a spouse.

The partial cause of a plane crash in 1983 in Spain can be attributed to domestic stress. Shortly before the crash the cockpit voice recorder indicated that the pilot had talked extensively about his domestic crisis with the co-pilot. The pilot misread his instruments and crashed into a mountain killing 181 people (Butcher, 2002, p. 175). A fight with a spouse or significant other creates a ripple effect that takes a while to calm. The life of a pilot does not always blend well with regular family life. A pilot may be away for days at a time. When problems at home arise, they are not able to simply run home from work early as they may be several time zones away. This can make things difficult on the entire family.

Whether a pilot is struggling with an interpersonal relationship at work, or a domestic issue with the family, an important factor in not letting these events take over the mind is to reduce rumination. Reducing rumination is important because, “Rumination involves attention to the past with a negative, judgmental quality and may be conceptualized as an attempt to make sense of an upsetting experience. The tendency to ruminate has been associated with difficulty shifting attention away from negative information” (Conley et al., 2018, p. 437). The 2018 study asked 228 students to complete questionnaires, negative mood manipulation, and a one-session

mindfulness training. Even with a short mindfulness training, the study says that, “although rumination also involves a high cognitive load, focused mindfulness may keep attention sufficiently occupied, preventing a return to the familiar process of rumination” (Conley et al., 2018, p. 442). Life events will always happen. What is important, and even critical with aviation, is not prevent these negative life events from taking over the brain entirely.

Depression

Depression is more common among airline pilots than many would expect. A 2016 study asked nearly 2,000 active airline pilots to complete the PHQ-9. The researchers found nearly 14 percent of airline pilots reported meeting the depression threshold of the PHQ-9, and 4.1 percent reported having suicidal thoughts (Wu, et al., 2016). This is not to say that 4.1 percent of the pilots are going to commit suicide, only that in the previous two weeks they had thoughts that they would be better off dead, or thoughts of hurting themselves in some way. In any case, these numbers are concerning for anyone, but the numbers become particularly concerning when we consider that this suicidal person is commanding an airplane with dozens of people on board.

The National Institute of Mental Health (NIMH) “estimated 17.3 million adults in the United States had at least one major depressive episode. This number represented 7.1 percent of all U.S. adults” (National Institute of Mental Health, 2020). Compare that to the 2016 study completed after the Germanwings crash, which focused only on airline pilots worldwide. “Our study found 12.6 percent of the pilots responding... met the criteria for likely depression” (Wu, et al., p. 1). The survey was a worldwide study of airline pilots and the NIMH statistic is only adults living in the United States. It is difficult to get an exact comparison between airline pilots and everyone else, but this does point to at least the possibility that airline pilots suffer a higher rate of depression than the general population.

Suicide

Suicide by commercial airliner is extremely rare, but not unheard of. In the last 30 years worldwide, there have been five confirmed cases of suicide by commercial aircraft resulting in the deaths of 550 people. (Flight Safety Foundation, 2015) The exact cause of these accidents varies, but it always involves a pilot with some sort of mental health condition intentionally flying their aircraft into the ground. In one case, the pilot was in the process of a divorce, his son had recently committed suicide, and his daughter had a severe heart defect. In another case, the pilot had recently found out he would no longer be allowed to operate international flights because of training deficiencies. These cases point to the despair that causes one to contemplate suicide in the first place. Suicide is typically something done alone, without physically harming others. Sadly, that is not what happened in these cases.

The most recent case of suicide by commercial airliner is Germanwings Flight 9525 which occurred on March 24, 2015. The flight had taken off from Barcelona, Spain flying to Dusseldorf, Germany. Approximately 35 minutes into the flight, while the Captain was out of the cockpit to use the lavatory, the First Officer disconnected the autopilot and intentionally flew the aircraft into the Alps, killing everyone on board. The subsequent accident investigation found that the First Officer had recently been diagnosed with a psychosomatic disorder and an anxiety disorder. This diagnosis would have medically disqualified the pilot, but he did not report it to the appropriate authorities as required, for fear of losing his right to fly (Bureau of Enquiry and Analysis for Civil Aviation Safety, 2015, March 24).

While these cases seem dramatic, they are also exceedingly rare. To put the toll in perspective, in that same timeframe that killed 550 people, nearly 65 billion passengers have flown on commercial airliners (The World Bank, 2020). According to the United States Centers

for Disease Control and Prevention (CDC), pilots die by suicide more often than the overall population of jobholders. The true extent of the problem is unknown. Airlines and the FAA are hesitant to release the data and suicides could be underreported due to limitations in determining the cause of accidents (Bialik, 2015). The NTSB, when investigating General Aviation accidents, is not always able to determine whether or not an accident was intentional or not.

Suicide, regardless of occupation, is a tragic end to a life. Mindfulness training is one possible tool to aid in reducing suicide not only among airline pilots but among everyone. Veterans who completed a 9-week course on Mindfulness-based Stress Reduction (MBSR) had significant reductions in anxiety, depression, and suicidal ideations. Suicidal ideations within the group decreased by almost half. The mediation analysis showed that mindfulness skills learned in the course played a significant role in improved depression, anxiety, and mental health scores. (Serpa, Taylor, & Tillisch, 2014) While there is a significant difference between military combat and airline flying, both occupations have substantial stress associated with the work.

Mindfulness and Job Performance

Major Gregory “Pappy” Boyington is credited with a well-known quote in aviation circles that, “Flying is hours and hours of boredom sprinkled with a few seconds of sheer terror”. This quote very succinctly sums up what aviation is to many pilots. How do pilots stay sharp in the moments of boredom to make sure they are ready for the seconds of sheer terror? Mindfulness involves paying attention on purpose without judgement. Pilots need to be able to see an event, be it a mechanical failure or any other non-normal event, as it unfolds in their cockpit. Then, they need to respond versus react to the threat. Responding without judgement is important because while a situation may invoke a feeling that they have already seen this problem before, each event is best handled with a beginner’s mind.

This next section will cover a few of the areas that are every-day parts of a pilot's life and how mindfulness could make an impact. Attention and awareness are the most obvious areas where mindfulness could play an important role. The flight deck is busy place where the pilots need to be a team and work together. Good communication can positively effect outcome and poor communication can have a negative effect. Mindfulness training can help provide the awareness that a pilot would need. But then when emergencies occur, it could help pilots to communicate effectively with others. As we will see, a successful outcome to an emergency situation can come down to how well a crew communicates with each other.

Jon Kabat-Zinn's definition of mindfulness certainly does not give the impression that paying attention on purpose is easy, it is something that needs to be practiced. If pilots can be trained to pay attention on purpose and be able to direct their attention, it could help them be prepared for those seconds of sheer terror.

Current role of mindfulness in aviation

Joseph Goldstein wrote, "On a boat in the middle of a great storm, one wise, calm person can bring everyone to safety" (Goldstein, 2016, p. 12). A pilot trained in mindfulness, can and should be this wise person bringing everyone to safety. A skilled pilot can safely navigate through challenging weather, mechanical issues, disruptive passengers, or whatever else may be thrown their way. At the beginning of this paper, I used Jon Kabat-Zinn's definition of mindfulness describing paying attention on purpose. In the English language we use the word mindfulness which is translated from the Pali word *sati*. There is another, also important definition of mindfulness to which I want to refer, again from Joseph Goldstein, "On another level, and one which we don't often associate with mindfulness, *sati* means 'remembering', and it refers to the practice of wholesome recollection that supports and energizes us on this path of

awakening” (Goldstein, 2016, p. 14). Remembering is extremely important for a pilot. Not so much for remembering how to fly an airplane, but more for remembering their training when abnormal situations happen.

Mindfulness is a new concept for commercial aviation. In researching this paper, only a handful of studies were found specifically examining mindfulness as it relates to aviation. There are a few additional studies that tie mindfulness to military aviation. In total, there are less than five studies found linking aviation to mindfulness. The relevant studies are included and discussed in this paper. Although there is a deficiency in connecting mindfulness and aviation, there is still information available. First, there are numerous studies tying mindfulness to attention, awareness, risk perception, and so on. There is also current literature from the FAA that while it does not specifically refer to mindfulness, it uses similar concepts. This is important, because in order to make mindfulness as widely accepted as possible by the FAA, airlines, and pilots; using already accepted sources to expand the message will be necessary. One such document that connects psychology and the pilot is the *Aviation Instructor’s Handbook*.

The *Aviation Instructor’s Handbook* is produced by the FAA and is a text book for instructors in aviation to use to help aid in their teaching. The book commits an entire chapter to The Learning Process. As a professional pilot and experts in our field, it is easy to think we are not students as well. Many of the points in this chapter point to common errors made by pilots even in commercial aircraft. By identifying and becoming aware of these behaviors’ pilots can improve their skills.

Educator, psychologist, and philosopher John Dewey introduced the concept of “reflective thought” in his 1910 book for teachers. Dewey saw “reflection as a process that

moves a learner from one experience into the next with a deeper understanding of its relationships with and connections to other experiences and ideas” (Federal Aviation Administration, 2020, p. 2-3). This concept of Dewey’s ties in very closely to the idea of dependent origination. Dependent origination is a Buddhist teaching “that there is nothing separate, nothing standing alone. Everything effects everything else” (Feldman, Spring 1999). This is important for pilots to understand and know, that what they have previously learned will affect how they view their current situation. Each abnormal or emergency situation they encounter will prepare them for the next such situation. Ideally, if they recall what has previously happened to them then they should be able to handle the next situation better.

Attention

Much of the benefits from mindfulness discussed to this point apply to nearly every occupation. Staying focused and aware, while again important for nearly anyone, it carries with it much greater consequences should a failure to maintain awareness happen to an airline pilot. In one of the few studies connecting mindfulness to commercial aviation, the study authors observed:

The mind cannot be wholly isolated from surrounding objects, events and experiences...The environment of an aircraft cockpit is more complex than a normal working environment. As such, pilots simply cannot focus their attention on every situation. Failure to recognize important changes or to pay attention to what is relevant in a cockpit situation can have serious consequences in aviation (Li et al., 2020, p. 6).

To operate safely, airline pilots need to have their mind and body in the same place at the same time. Pilots are human, their minds wander. When they do wander, they will need tools to

return their minds back to the flight deck or else a simple mind wandering could be the start of an error chain leading to an accident.

Commercial aviation has far too many examples where a loss of focus has caused an accident. In 2006 a flight crew taxiing to the runway, because of a non-pertinent conversation, was not paying attention and taxied to an incorrect and closed runway. The air traffic controller working his second eight-hour shift in a 24-hour period missed this mistake as well. The crew attempted to take off on the closed runway that was far shorter than required. The resulting accident killed 49 of the 50 people on board (National Transportation Safety Board, 2006).

Not all errors are fatal. In 2009 a Northwest Airlines crew operating a flight from San Diego, CA to Minneapolis, MN overflowed their destination by 100 miles. When interviewed after the incident the crew admitted to being distracted:

The pilots said there was a concentrated period of discussion where they did not monitor the airplane or calls from Air Traffic Control (ATC) even though both stated they heard conversation on the radio. Also, neither pilot noticed messages that were sent by company dispatchers. They were discussing the new monthly crew flight scheduling system that was now in place as a result of a merger. The discussion began at cruise altitude (National Transportation Safety Board, 2009).

Distractions on the flight deck come in many forms. In the above case the distraction was from new scheduling software causing an arrival delay. Whatever the cause, flight crews need tools to recognize when their mind has wandered and how to come back to the flight deck.

Awareness

Mindfulness as a tool to increase awareness was studied using a Norwegian military combat aircraft squadron. Using a mindfulness intervention following the guidelines of the

MBSR program developed by Jon Kabat-Zinn, the participants received a one-day introductory seminar followed by 14 3-hour plenary sessions every third week over a period of 12-months. A general postintervention increase in the retrospective scores on all the factors of mindfulness using the Five Facet Mindfulness Questionnaire, together with the fact that the level of mindfulness remained higher throughout the two years of the follow-up period, provides evidence for the effectiveness of the intervention. This is consistent with the theory suggesting that mindfulness is a multifaceted construct that develops synergistically over time (Holzel et al., 2011, p. 537). The largest changes were reported for the ability to observe, act with awareness, and be nonreactive toward inner sensations and experience (Meland et al., 2015, p. 57).

The ability to observe, act with awareness, and be nonreactive toward inner sensations and experience are critical skills an airline pilot employs while on the job. Lack of focus, particularly in high stress moments, can lead to large mistakes. In a different Norwegian study, this time on a military helicopter unit, they looked at how mindfulness training affected cortisol levels. Cortisol is one of the biological mediators providing energy to cope with daily demands and is regarded as a reliable marker of the physiological stress response. For the mindfulness training they again followed the guidelines of Jon Kabat-Zinn's MBSR over a much shorter duration than the combat squadron. They found, "that Mindfulness Training could be implemented specifically to reduce stress in high-workload settings where attentiveness to the task is particularly important" (Meland, et al., p. 205). Between these two studies we see mindfulness training provided the pilots better awareness, improvements to nonreactivity, and reduced stress in high-workload settings.

Crew communication

Crew communications is another important facet of airline pilot job performance. As much as we would like the world to be peaceful and harmonious, we inevitably encounter those with whom we have difficulty creating a pleasant work environment. In most occupations, with the use of email and other electronic forms of communication, contact with these types of people could be limited and distance can be created. On the flight deck this distance is not available. Pilots often have little choice with whom they are paired to fly. If a pilot feels that they are not able to work with someone, there are few remedies beyond removing themselves from the trip sequence, usually at a financial cost to themselves. In other cases, it may be well into a flight before the breakdown in communication occurs and becomes problematic:

Working relationship greatly depends upon power distance. In low power distant workplace employees are perceived as partners and management style is more or less the democratic one. On the contrary in high power distance cultures the management style is the autocratic one where managers and the employees apparently consider each other as unequal, and superior man is the one who often takes a decision without consulting subordinates (Alam, 2015, p. 193)

It has been argued that “good flying skills cannot overcome the adverse effects of hampered and poor communication in the cockpit” (p. 192). This points to a greater need for good communication on the flight deck because of the potential safety implications. A crew that communicates better should show improved handling of emergency situations.

In 1978, a United Airlines DC-8 crashed outside of Portland, OR when the aircraft ran out of fuel while approaching the airport. The National Transportation Safety Board (NTSB) which investigated the accident determined it was partly caused by the result of the flightdeck crew failing to communicate effectively about the amount of fuel remaining on board.

Compare that with another accident from 1989. This time it was a United Airlines DC-10 that was cruising at 37,000 feet when one of the three engines exploded, severing all the hydraulic lines. Because of the heavy air loads on the flight control surfaces of an aircraft, modern airplanes use hydraulic systems to assist crews in moving the flight controls. With the loss of hydraulic power, an event with a one in a billion chance of happening, the plane became nearly unflyable. Miraculously, by manipulating engine thrust, the crew was able to maneuver the aircraft to Sioux City, Iowa but ended up crashing while attempting an emergency landing at the airport. While many people died in this accident, over half of the airplane survived what should have been a nonsurvivable catastrophic failure. In this case, the NTSB noted that the subsequent coordinated teamwork was a key factor in the flight remaining airborne and being able to attempt a landing (Ford, O'Hare, & Henderson, 2013, p. 501).

The fact that both accidents noted occurred at United Airlines is not coincidental. The first accident in 1978 became a catalyst for what is known as Crew Resource Management (CRM). Crew Resource Management is used by airlines to help crews improve communications with each other on the flight deck. While CRM focuses primarily on safety of flight, there are also benefits to interpersonal communications as well. Shortly after the Portland accident the FAA mandated CRM training for all flight crews in the United States with United Airlines being a leader in its development and implementation. The result of this training was clear when years later the Captain of the crippled DC-10 was able to work with the other pilots to mitigate the loss of control. A feat that 15 years prior may have not happened if not for the development of CRM. This demonstrates the need for crews to be able communicate effectively and focus on safely operating the aircraft.

Flight deck management

While communication is important, good conflict management is an important tool for an airline crew as well. At the core of conflict management is how a crew communicates. A recent study looked at mindfulness and conflict in the workplace. While the results are not specific to flight crews, the information gained could be adapted to train pilots in better conflict management which would ideally lead to improved communication on the flight deck.

There are five generally agreed upon conflict management styles; collaborative, accommodating, compromising, competing, and avoiding. Because of its highly constructive approach, collaborative is considered a “win-win” method that yields the optimal outcomes and promotes positive relations. Avoidance on the other end of the spectrum is seen as problematic because the parties are unable to exchange information and find mutually agreeable solutions (Kay & Skarlicki, 2020, p. 9).

When we look at the above accidents, we see both collaborative and avoidant communication. The accident in Portland, Oregon was a result of the Captain not creating an atmosphere of cooperation on the flight deck. This led the Flight Engineer to an avoidance style, whereas he did not articulate the dire fuel status to the Captain. The Sioux City, Iowa accident was at the other end of the spectrum of flight deck communication and leadership. In this accident the Captain used all available resources, including bringing an off duty United pilot who was a passenger in the cabin into the flight deck, to help solve the problem. When time permitted the Captain worked together with the other pilots to make the best decision. By the mere fact that the wounded aircraft made it to a large airport is evidence that the approach to problem solving worked.

On the flight deck, sometimes events transpire so quickly that there is not time to utilize a collaborative approach to conflict. Alternatively, one pilot may be of the collaborative mindset

whereas the other may be avoidant. In any case, mindfulness could help mitigate these situations. When people enter into conflict, if they see the situation as threatening or feel anxious about it and then notice their apprehension, they can be said to engage in metacognition. Mindfulness facilitates metacognition that goes beyond merely thinking about primary thoughts and emotions, instead altering the very way people relate to them, finding that mindfulness increases collaboration and reduces conflict avoidance. “People that engage in mindful metacognition are able to detach and disidentify from their thoughts and emotions, thus perceiving them as a subjective phenomenon of the mind rather than objective features of reality” (Kay & Skarlicki, 2020, p. 10). This detachment from thoughts and emotion can be an important factor when operating an aircraft without much time to work on collaboration. Instead of a pilot internalizing an event, they would be able to offer a level of detachment.

Risk assessment

Assessing risk is an important area for pilot job performance that may be improved by mindfulness. There is almost no part of flying an airplane that does not involve risk. Much of a pilot’s job is assessing and managing that risk. The FAA looked at pilot risk perception and risk tolerance to determine how it affects aircraft accidents. “Poor pilot decision-making has been implicated as a leading factor in fatal general aviation accidents, and poor risk assessment can contribute significantly to poor decision-making.” (Hunter, 2002, p. 1)

In 2018, a small study, surveying 295 pilots; looked at the relationship between trait mindfulness and how it relates to risk perception and flight experience. The theory is that pilots with improved mindfulness have better risk assessment thus a lower incident rate. Pilot flight experience also has a negative effect on incident rate. The study concluded, “it can be said that trait mindfulness has both a direct and indirect effect via risk perception on pilots' involvement in

incidents, and that the direct effect is also moderated by flight experience” (Ji et al., 2018, p. 166). The study found a less experienced pilot with higher trait mindfulness, as measured by the Mindfulness Attention Awareness Scale (MAAS), had a lower incident rate than a more experienced pilot with less mindfulness. The concept is that higher mindfulness informs risk perception. Better risk perception leads to better decision-making and a lower incident rate.

Discussion and Mindfulness Course

Mindfulness is a tool that is continually finding new uses. It has only been very recently that we have begun to look at the impact of mindfulness in aviation. The initial data is promising. While mindfulness specifically related to aviation is a new thing, many of the pieces that go into making a safe pilot have already been studied i.e., stress, risk assessment, and interpersonal communication to name a few. Much of what a pilot experiences at work can be applied to most professions. What is different is the impact of a mistake. There are few professions in the world that a mistake can lead to the deaths of dozens or even hundreds of people.

There are many ways to teach mindfulness. One of the most common is to teach a beginner in mindfulness through an 8-week MBSR program. These programs provide a well-rounded overview of mindfulness while providing several different practices such as sitting and walking meditations, body scans, and mindful eating. This program has been adapted into several different forms of varying lengths. But what has remained consistent are the lessons the programs teach.

To be effective, a mindfulness program needs to teach the participants to understand how their mind works, how to recognize mind wandering, and how to bring the mind back. There is supporting evidence that this training does not need to occur over an extended period of time,

that even an intervention of a short duration can have an impact on the participant. A study mentioned above provided social workers with a two-day intervention that yielded positive results. It is not too much of a stretch to think that a one-day intervention could also yield similar results.

All pilots are assigned a crew base. This is an airport from which all of a pilot's scheduled flight sequences will begin and end. These bases are located in large cities that often have a high cost of living. One of the benefits provided an airline pilot is free or reduced rate, space available travel. Due to the high cost of living in most crew bases, and this easy travel option, many pilots will choose to live in cities far away from their base. They could live a several hours drive, or even a transcontinental flight away from their base.

While this ability to live far from a base is a great benefit for pilots, it also poses a difficulty when trying to bring pilots together for mindfulness training. A pilot will often be willing to travel to their crew base a day early or remain in their base an extra day for something beneficial, like mindfulness training, but as the length of training increases the likelihood of attracting participants reduces. This makes it important that an intervention built for pilots be long enough to teach the required items but short enough to attract participants. I believe that a one-day mindfulness intervention, while not optimum for reaching great depths of understanding, will be sufficient to provide a real and measurable change to the pilot.

The primary areas of focus for the workshop will be stress, attention and awareness, and interpersonal skills. These areas are important and the basic concepts, as they relate to mindfulness, can reasonably be taught in a day. The goal is not to create experts in mindfulness; the goal is to provide an understanding of how to focus attention. From this basic level of understanding the participants can continue their practice.

Wu et al (2016) found that nearly fourteen percent of their participants report depressive feelings to the level that would meet the criteria to be moderately depressed, and a four percent reported having thoughts that they would be better off dead, or thoughts of hurting themselves in some way. The PHQ-9 still necessitated candid answers from the person taking the assessment. Because it is only nine questions, the purpose of the assessment is fairly obvious. Should one want to skew their answers to seem less severe, that would be a simple task. While this is supposition, it is likely that because pilots, by way of having to maintain a medical certificate, are always on high alert for saying or doing anything that could jeopardize that certificate, it is possible that these numbers underreport the true level of depression and suicidal ideations.

Wu et al (2016) used an anonymous, web-based survey which likely attained as close to accurate numbers as possible. It is still likely that the actual numbers of those who are depressed or have suicidal ideations are higher. The authors even point out that “the prevalence of depression among pilots from our study is much higher than some studies utilizing identifiable surveys and medical records and possibly lower than another study” (p. 6). The other study referenced in this Wu et al looked at how often depression was the cause of long-term disability in a cohort of commercial airline pilots.

As of this writing, the last fatal plane crash of a United States airliner was well over a decade ago on February 12, 2009. While it is a phenomenal achievement to have such a streak without fatalities, in that same time period there have been many pilots who have lost their lives to suicide. Meanwhile, dozens or hundreds of pilots’ lives are in turmoil because they are unable to control the thoughts in their heads. They wake up every day and fight the silent battle of mental health, often alone out of fear of losing their livelihood. While I believe mindfulness can

make great strides in increasing attention and awareness, the program needs to have a component that centers directly on stress and mental health.

Although I have highlighted stress and depression a more immediate concern, integrating mindful techniques into the flight deck is still important. In aviation there is never one single cause of an accident. There is often what is known as an “error chain”, essentially a string of mistakes in which the final mistake causes the accident. Should the chain be broken, the accident is thus prevented. As we saw earlier, a pilot with increased mindfulness has a lower incident rate. The study proposes “adopting psychological selection methods for pilots, taking the candidates’ mindfulness into consideration” (Li et al., 2020, p. 6). While I think the psychological selection is an unnecessary step, the study does indicate a performance advantage for pilots with increased mindfulness.

In mindfulness we talk about providing space or responding versus reacting. Usually, when something happens, there is time to step back and gather your thoughts before responding. In an airliner traveling at 400 miles per hour there is not always enough time to have a full conversation about what is happening before someone needs to act. Pilots do not have much choice with whom they are assigned to fly. Airlines are so large that often times pilots may be meeting for the first time in the hour before the flight departs. Thanks to rigorous standardization, the pilots can count on the other pilot to fly the plane “by the book” and as the airline as trained them. The roles of the two pilots are well delineated and each pilot knows what to expect from the other.

What is not trained are the soft skills that go into the job. Sometimes mistakes happen, which is why there are two pilots in the cockpit. How a pilot directs attention to the error is a critical factor. As a general rule, pilots are a confident group of people. It takes a high level of

confidence to fly an airplane, in congested airspace, in bad weather and not let it consume you in fear. Through years of flight training pilots have all the tools they need to be able to thrive in this environment. Yet sometimes confidence grows to the point where ego steps in. At this point communication becomes significantly more difficult as the pilot committing the error will very likely become defensive upon having that error brought to light.

When it comes to training a pilot on how to communicate with each other, the airlines do not do much, nor is the training required. Training time spent on these types of soft skills often take away from other areas. Plus, every additional training hour comes at a financial cost. Unless and until it can be demonstrated that teaching better communication will reduce accidents thus saving money and lives, there will probably not be any additional time spent on communication. Yet communication is such an important skill. Personality conflicts will occur, and in aviation that has the potential to erode safety margins. Pilots need to have tools available so that a comment on the safety of flight does not become a shouting match at 35,000 feet. The flight deck has a clear hierarchy with the Captain as the final authority as to the operation of the flight. While there must be a final authority on the flight deck, that does not mean that the Captain is best acting as a dictator. To be successful a Captain needs to learn to take input from those that are considered a subordinate. The biologist Thomas Huxley has said, "It is not who is right, but what is right, that is of importance". A pilot needs to be able to put their internal thoughts aside and try to find the right answer.

Conclusion

It is not unique to experience stress at work. Much of the discussion around stress and anxiety could apply to any occupation. What is an important difference is what can result when the stress begins to cause mistakes. If someone working in an office were to have marital

troubles and have difficulty concentrating at work, there would potentially be a day of lost work while they ruminated on their life. For an airline pilot, losing concentration at work can have dire consequences.

Teaching pilots to direct their focus and awareness, improve their communication and conflict management skills, and enhance risk assessment are vital skills to master. An airline pilot already has the experience to know what is and is not important for the safety of their flight. What will become difficult is being able to keep the mind focused on the primary task when there are multiple tasks to complete. Mindfulness could enhance the tools that a pilot already has. The goal is to remain focused on the safety of the flight. There will always be distractions; from inside the flight deck, outside the flight deck, or even inside the pilot's own mind. Pilots need to be able to separate what is real versus what they have constructed in their own mind as reality. Mindfulness training has promise to assist a pilot to determine what is real and what is a construct of their own mind.

References

- Alam, M. A. (2015, January). Cockpit learning in power distant cockpits: The interaction effect of pilot's interdependence and inclination to teamwork in airline industry. *Journal of Air Transport Management*, 42, 192-202.
- Bialik, C. (2015, March 27). *We don't know how often pilots commit suicide*. Retrieved from FiveThirtyEight: <https://fivethirtyeight.com/features/pilot-suicide-germanwings/>
- Bor, R., Eriksen, C., Oakes, M., & Scragg, P. (Eds.). (2017). *Pilot mental health assessment and support: A practitioner's guide*. Routledge Taylor & Francis Group.
- Bureau of Enquiry and Analysis for Civil Aviation Safety. (2015, March 24). *Accident on 24 March 2015*. Retrieved from https://www.bea.aero/uploads/tx_elyextendttnews/BEA2015-0125.en-LR_08.pdf
- Butcher, J. N. (2002, March/June). Assessing pilots with 'the wrong stuff': A call for research on emotional health factors in commercial aviators. *International Journal of Selection and Assessment*, 10, 168-184.
- Conley, S. L., Faleer, H. E., Raza, G. T., Bailey, B. E., & Wu, K. D. (2018). The moderating effects of rumination facets on the relationship between mindfulness and distress reduction. *Cognitive Therapy and Research*, 42, 436-446.
doi:<https://doi.org/10.1007/s10608-018-9896-7>
- Federal Aviation Administration. (2018, July 30). *Fact Sheet - General Aviation Safety*. Retrieved from Federal Aviation Administration:
https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=21274

Federal Aviation Administration. (2020). *Aviation instructor's handbook*. U.S. Department of Transportation.

Feldman, C. (Spring 1999). Dependent origination. *Insight Journal*, 37. Retrieved from Barre Center for Buddhist Studies: <https://www.buddhistinquiry.org/article/dependent-origination/>

Flight Safety Foundation. (2015, March 26). *List of aircraft accidents and incidents intentionally caused by pilots*. Retrieved from Aviation Safety Network: <http://news.aviation-safety.net/2015/03/26/list-of-aircraft-accidents-and-incidents-deliberately-caused-by-pilots/>

Ford, J., O'Hare, D., & Henderson, R. (2013). Putting the "we" into teamwork: Effects of priming personal or social identity on flight attendants' perceptions of teamwork and communication. *Human Factors and Ergonomics Society*, 55, 499-509.

Goldstein, J. (2016). *Mindfulness a practical guide to awakening*. Boulder, CO: Sounds True.

Holzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 537-559.

Hunter, D. R. (2002). *Risk perception and risk tolerance in aircraft pilots*. Washington, DC: U.S. Department of Transportation.

Ji, M., Yang, C., Li, Y., Xu, Q., & He, R. (2018). The influence of trait mindfulness on incident involvement among Chinese airline pilots: The role of risk perception and flight experience. *Journal of Safety Research*, 66, 161-168.

Kabat-Zinn, J. (2005). *Coming to our senses*. New York, NY: Hachette Books.

Kay, A. A., & Skarlicki, D. P. (2020). Cultivating a conflict-positive workplace: How mindfulness facilitates constructive conflict management. *Organizational Behavior and Human Decision Processes*, 159, 8-20.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001, September). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16, 606-613.

Li, Y., Chen, H., Xin, X., & Ji, M. (2020, January 25). The influence of mindfulness on mental state with regard to safety among civil pilots. *Journal of Air Transport Management*, 84. doi:<https://doi.org/10.1016/j.jairtraman.2020.101768>

Meland, A., Fonne, V., Wagstaff, A., & Pensgaard, A. (2015, January-March). Mindfulness-based mental training in a high-performance combat aviation population: A one-year intervention and two-year follow-up. *International Journal of Aviation Psychology*, 25(1), 48-61.

Meland, A., Ishmatsu, K., Pensgaard, A., Wagstaff, A., Fonne, V., Garde, A., & Harris, A. (2015, October). Impact of mindfulness training on physiological measures of stress and objective measures of attention control in a military helicopter unit. *The International Journal of Aviation Psychology*, 25(3-4), 191-208.

Modell, J. G., & Mountz, J. (1990, August 16). Drinking and flying - The problem of alcohol use by pilots. *New England Journal of Medicine*, 323, 455-461.

National Institute of Mental Health. (2020). *Mental Health Information*. Retrieved from National Institute of Mental Health: https://www.nimh.nih.gov/health/statistics/major-depression.shtml#part_155720

National Transportation Safety Board. (2006). *Attempted Takeoff From Wrong Runway*. Washington, DC: National Transportation Safety Board.

National Transportation Safety Board. (2009, October 26). *NTSB News Release*. Retrieved from National Transportation Safety Board: https://www.nts.gov/news/press-releases/Pages/NTSB_Issues_Update_on_its_Investigation_of_Flight_188_that_Overflew_Intended_Minneapolis_Airport.aspx

Olendzki, A. (2010). *Unlimiting Mind: The Radically Experiential Psychology Of Buddhism*. Somerville, MA: Wisdom Publications.

Serpa, J. G., Taylor, S. L., & Tillisch, K. (2014, December). Mindfulness-based Stress Reduction (MBSR) reduces anxiety, depression, and suicidal ideations in veterans. *Medical Care*, 52, S19-S24.

The World Bank. (2020, October). *Air transport, passengers carried*. Retrieved from The World Bank: <https://data.worldbank.org/indicator/IS.AIR.PSGR>

Trowbridge, K., Lawson, L. M., Andrews, S., Pecora, J., & Boyd, S. (2017, November). Preliminary investigations of workplace-provided compressed mindfulness-based stress reduction with pediatric medical social workers. *Health and Social Work*, 42(4), 207-214.

Wu, A. C., Donnelly-McLay, D., Weisskopf, M. G., McNeely, E., Betacourt, T. S., & Allen, J.

G. (2016). Airplane pilot mental health and suicidal thoughts: a cross-sectional descriptive study via anonymous web-based survey. *Environmental Health, 15*, 1-12.

Zimmerman, M. (2016, April 27). *Danger in the cockpit: FAA records show pilots fly drunk,*

engage in criminal activity. Retrieved from Fox News:

<https://www.foxnews.com/us/danger-in-the-cockpit-faa-records-show-pilots-fly-drunk-engage-in-criminal-activity>

Appendix A

Mindfulness Training Workshop for Airline Pilots Outline

Opening 0:30

Introduction 1:00

Job Performance Discussion 1:30

Emotional Health Discussion 1:30

Wrap up 0:30

Appendix B

